We claim:

1. A semiconductor structure comprising:

a monocrystalline substrate;

an amorphous layer formed on the substrate; and

a first monocrystalline nitride material layer overlying the amorphous layer and formed of at least one from the group comprising GaN, GaInN, AlGaN, SiN and AlN.

2. The semiconductor structure of claim 1, wherein the amorphous layer comprises an oxide formed as a monocrystalline oxide and subsequently heat treated to convert the monocrystalline oxide to an amorphous oxide.

3. The semiconductor structure of claim 1, wherein the first monocrystalline nitride material layer is formed by nitridation of a first monocrystalline material layer selected from the group comprising GaAs, GaInAs, AlGaAs, Si and AlAs.

4. The semiconductor structure of claim 1, wherein the substrate comprises silicon.

The semiconductor structure of claim 2, wherein the monocrystalline oxide is formed of material selected from the group comprising Sr_zBa_{1-z},TiO_3, $Sr_zBa_{1-z}ZrO_3$, $Sr_zBa_{1-z}HfO_3$, $Sr_zBa_{1-z}SnO_3$ and $CaTiO_3$, where z ranges from 0 to approximately 1.

5. The semiconductor structure of claim 1, further comprising a monocrystalline material layer formed overlying the amorphous layer and underlying the first monocrystalline nitride material layer.

6. The semiconductor structure of claim 1, further comprising a template layer positioned between the amorphous layer and the monocrystalline nitride material layer.

7. The semiconductor structure of claim 7, wherein the template layer is formed of material selected from the group comprising Ti-As, Sr-O-As, Sr-Ga-O, Ti-O-As, or Sr-Al-O.

8. The semiconductor structure of claim 7, wherein the template layer comprises a Zintl-type phase material.

9. The semiconductor structure of claim 9, wherein the Zintl-type phase material comprises at least one of $SrAl_2$, $SrAl_4$, $(MgCaYb)Ga_2$, (Ca, Sr, Eu, Yb)In_2, $BaGe_2As$, and $SrSn_2As_2$.

10. The semiconductor structure of claim 7, wherein the template layer comprises a surfactant material.

11. The semiconductor structure of claim 11, wherein the surfactant material comprises at least one of Al, In, and Ga.

12. The semiconductor structure of claim 11, wherein the template layer further comprises a capping layer.

13. The semiconductor structure of claim 13, wherein the capping layer is formed by exposing the surfactant material to a cap-inducing material.

14. The semiconductor structure of claim 14, wherein the cap-inducing material comprises at least one of As, P, Sb, and N.

15. The semiconductor structure of claim 13, wherein the surfactant comprises Al, and the capping layer comprises Al_2Sr.

16. The semiconductor structure of claim 3, wherein said first monocrystalline material layer has a thickness in the range of from about 20 angstroms to about 50 angstroms.

17. A process for fabricating a semiconductor structure comprising:

providing a monocrystalline substrate;

epitaxially growing an accommodating buffer layer overlying the substrate;

epitaxially growing a first monocrystalline material layer overlying the accommodating buffer layer;

nitriding at least a portion of the first monocrystalline material layer to form a first monocrystalline nitride material layer; and

heat treating the structure to convert the accommodating buffer layer to an amorphous layer.

18. The process of claim 18, further comprising forming a second monocrystalline nitride material layer overlying the first monocrystalline nitride material layer.

19. The process of claim 18, further comprising forming an amorphous oxide layer underlying the accommodating buffer layer during epitaxially growing the accommodating buffer layer.

20. The process of claim 18, wherein providing a monocrystalline substrate comprises providing a substrate formed of silicon.

21. The process of claim 18, further comprising epitaxially growing a second monocrystalline material layer overlying the accommodating buffer layer and underlying the first monocrystalline material layer.

22. The process of claim 18, wherein epitaxially growing a first monocrystalline material layer comprises epitaxially growing a first monocrystalline material layer selected from the group comprising GaAs, GaInAs, AlGaAs, Si and AlAs.

23. The process of claim 18, wherein epitaxially growing an accommodating buffer layer comprises epitaxially growing an accommodating buffer layer selected from the group comprising Sr_zBa_{1-z},TiO_3, Sr_zBa_{1-z},ZrO_3, Sr_zBa_{1-z},HfO_3, Sr_zBa_{1-z},SnO_3, and $CaTiO_3$, where z ranges from 0 to approximately 1.

24. The process of claim 18, wherein each of the steps of epitaxially growing comprises epitaxially growing by a process selected from the group consisting of MBE, MOCVD, MEE, CVD, PVD, PLD, CSD and ALE.

25. The process of claim 18, wherein nitriding comprises nitriding by a process selected from the group comprising RF plasma processing, ECR plasma processing, or Eximer laser processing.

26. The process of claim 18, wherein heat treating comprises subjecting the structure to a temperature in the range of from about 700 degrees Celsius to about 900 degrees Celsius.

27. The process of claim 18, further comprising forming a template layer positioned between the accommodating buffer layer and the first monocrystalline material layer.

28. The process of claim 18, wherein the nitriding comprises nitriding to form a first monocrystalline nitride material layer formed of material selected from the group comprising GaN, GaInN, AlGaN, SiN and AlN.

29. The process of claim 18, wherein epitaxially growing a first monocrystalline material layer comprises epitaxially growing a first monocrystalline material layer having a thickness in the range of from about 20 angstroms to about 50 angstroms.

30. A semiconductor structure fabricated from a process comprising:

providing a monocrystalline substrate;

epitaxially growing an accommodating buffer layer overlying the substrate;

epitaxially growing a first monocrystalline material layer overlying the accommodating buffer layer;

nitriding at least a portion of the first monocrystalline material layer to form a first monocrystalline nitride material layer; and

heat treating the structure to convert the accommodating buffer layer to an amorphous layer.

31. The semiconductor structure of claim 31, wherein the process further comprises forming a second monocrystalline nitride material layer overlying the first monocrystalline nitride material layer.

32. The semiconductor structure of claim 31, wherein the process further comprises forming an amorphous oxide layer underlying the accommodating buffer layer during epitaxially growing the accommodating buffer layer.

33. The semiconductor structure of claim 31, wherein providing a monocrystalline substrate comprises providing a substrate formed of silicon.

34. The semiconductor structure of claim 31, wherein the process further comprises epitaxially growing a second monocrystalline material layer overlying the accommodating buffer layer and underlying the first monocrystalline material layer.

35. The semiconductor structure of claim 31, wherein epitaxially growing a first monocrystalline material layer comprises epitaxially growing a first monocrystalline material layer selected from the group comprising GaAs, GaInAs, AlGaAs, Si and AlAs.

36. The semiconductor structure of claim 31, wherein epitaxially growing an accommodating buffer layer comprises epitaxially growing an accommodating buffer layer selected from the group comprising Sr_zBa_{1-z},TiO_3, $Sr_zBa_{1-z}ZrO_3$, $Sr_zBa_{1-z}HfO_3$, $Sr_zBa_{1-z}SnO_3$ and $CaTiO_3$, where z ranges from 0 to approximately 1.

37. The semiconductor structure of claim 31, wherein each of the steps of epitaxially growing comprises epitaxially growing by a process selected from the group consisting of MBE, MOCVD, MEE, CVD, PVD, PLD, CSD and ALE.

38. The semiconductor structure of claim 31, wherein nitriding comprises nitriding by a process selected from the group comprising RF plasma processing, ECR plasma processing, or Eximer laser processing.

39. The semiconductor structure of claim 31, wherein heat treating comprises subjecting the structure to a temperature in the range of from about 700 degrees Celsius to about 900 degrees Celsius.

40. The semiconductor structure of claim 31, wherein the process further comprises forming a template layer positioned between the accommodating buffer layer and the first monocrystalline material layer.

41. The semiconductor structure of claim 31, wherein the nitriding comprises nitriding to form a first monocrystalline nitride material layer formed of material selected from the group comprising GaN, GaInN, AlGaN, SiN and AlN.

42. The semiconductor structure of claim 31, wherein epitaxially growing a first monocrystalline material layer comprises epitaxially growing a first monocrystalline material layer having a thickness in the range of from about 10 angstroms to about 100 angstroms.